



Habitat preferences of *Hericium erinaceus* in Slovakia



Vladimír Kunca*, Marek Čiliak

Technical University in Zvolen, Faculty of Ecology and Environmental Sciences, Department of Applied Ecology, T.G. Masaryka 24, SK-960 53 Zvolen, Slovakia

ARTICLE INFO

Article history:

Received 3 May 2016

Received in revised form

9 December 2016

Accepted 19 December 2016

Available online 7 January 2017

Corresponding Editor: Jacob Heilmann-Clausen

Keywords:

Old-growth forests

Cultural forests

Indicator species

Quercus spp.

Fagus sylvatica

ABSTRACT

Distribution patterns, ecology and habitats of *Hericium erinaceus* in Slovakia are presented, together with an indication of its population size and dynamics as driven by the type of substratum the fungus feeds on. Basidiomata have been recorded both on living and dead trees, predominantly on oaks (*Quercus* spp.) but also on European beech (*Fagus sylvatica*), and at altitudes ranging from 103 to 753 m, which in Slovakia corresponds to warm hilly and upland beech-oak forests. Standing trunks were a more common substratum than fallen trunks. Although the fungus tends to occur in old-growth forests, nearly half of the observations were from managed forests. Given the observed distribution, we conclude that *H. erinaceus* is not a strict indicator of intact old-growth forests in Slovakia.

© 2016 Elsevier Ltd and British Mycological Society. All rights reserved.

1. Introduction

Although rare in Europe and red-listed in numerous European countries (Boddy et al., 2011), *Hericium erinaceus* is an easily recognisable fungus (Fig. 1). A good deal of information is available about its cultivation (Ko et al., 2005; Sokół et al., 2015) and about its distribution and ecology in Europe (Fraiture and Otto, 2015). Recently, the use of this fungus became very popular throughout the northern hemisphere due to its medicinal properties (Thongbai et al., 2015). Its distribution covers the whole of Europe, with the highest frequency of finds in *Quercus* spp. woodlands (Bernicchia and Gorjón, 2010), however the basidiomata may occur on living, weakened trees and dead trunks of many broad-leaved tree species. The fungus is included in the list of 21 fungal indicator species of conservation value of European beech forests (Christensen et al., 2004) and is also listed as a species of special interest (class B) (Ódor et al., 2006), which denotes widespread species regarded as rare in Europe and threatened in several individual countries.

Landres et al. (1988) defined an indicator species as “an organism whose characteristics (e.g. presence or absence, population density, dispersion, reproductive success) are used as an index of

attributes too difficult, inconvenient, or expensive to measure for other species or environmental conditions of interest.” Fungi can be used as indicator species (Kranabetter et al., 2009; Halme et al., 2017), in particular the forest-dwelling ones (Blasi et al., 2010), highlighting various aspects of forest ecology such as biodiversity (Parmasto, 2001) or forest continuity or nature conservation value (Christensen et al., 2004). Even though an indicator species cannot act as a surrogate for total biodiversity, all environmental conditions or habitat qualities, macrofungi have the potential to indicate conservation value and to act as easy tools to communicate complex biodiversity issues to the broader public (Halme et al., 2017). The objective of this paper was to review ecological conditions and habitat preferences of *H. erinaceus* in Slovakia, with special emphasis on forest conservation status and history of stand management. This contribution also evaluated the value of the species as an indicator for the classification of old-growth forests in Slovakia.

2. Materials and methods

We compiled a database of records of collections of *H. erinaceus* in Slovakia by processing data from herbaria (public herbaria BRA, SLO, PRM, PRC – abbreviations of public herbaria adhere to Index Herbariorum (Thiers, continuously updated)), published records (Kuthan et al., 1999; Škubla, 2003), personal records (private

* Corresponding author.

E-mail address: kunca@tuzvo.sk (V. Kunca).



Fig. 1. Basidiomata of *Hericium erinaceus* (Javorie Mts., Slovakia) (Photo: Vladimír Kunca, 15 October, 2013).

herbarium of Vladimír Kunca (PVKU)) and communication with active amateur field mycologists (www.nahuby.sk). Records originate from the whole territory of Slovakia and include habitats considered suitable for the species. Most of the records were collected by about 20 individual collectors and originate from a range of forest types surveyed throughout the year.

Altitude, tree species, living/dead, standing/lying tree and intensity of management of forest stands were evaluated in this study. All surveys were based on basidiomata occurrence and some result from targeted searches. Single-parameter data containing only one-dimensional entry (e.g. date or tree species) were also included in our database. Duplicate records referring to the same tree, stem or stump were evaluated as one database entry.

Classification of forest stands in terms of management and naturalness followed Holec et al. (2015). The categorisation of forest stands according to forest management plans (commercial, protection and special purpose forests) was considered the most important parameter, followed by *in-situ* assessment of tree species composition, age, horizontal and vertical structure, dead wood presence and occurrence of veteran trees. We also considered the observer identity and the inclusion of the forest in the list of old-growth forests and their remnants in Slovakia (www.pralesy.sk/lokality/). Actual tree species composition was compared to that expected on the basis of forest site classification (based on soil, climate, water regime and landscape conditions) (Vološčuk, 2001).

3. Results

In total, 86 records of *H. erinaceus* were included in this study, of which basidioma voucher specimens exist or were confirmed in 45 records. Data prior to 2000 comprise 23% of the total records, 51 records had accompanying altitude data, 76 had host tree identification (tree genus or species), 70 had vital status and standing or fallen stem indication. We were able to assign forest stand naturalness to 38 of the 86 records.

Altitude of records ranged from 103 to 753 m, with the average value of 423 m a.s.l. (Fig. 2A). Fruiting basidiomata were recorded predominantly on oaks (68.4%), the next most common species was beech (25%, Fig. 2B). The species was recorded with equal frequency on dead and living trees (Fig. 2C), but was less frequent on fallen (31.4%) compared to standing trunks (60%). A majority (83%) of standing trunks were living. We found similar numbers of records of *Hericium erinaceus* in relatively undisturbed old-growth and intensively managed forests (Fig. 2D).

4. Discussion

There are numerous records of *H. erinaceus* in Slovakia dating from the last two decades. The species occurs in varying types and categories of forests and biotopes. It was found in similar numbers in old-growth and cultural forests, and is present almost over the whole of the territory of Slovakia, from the lowlands to sub-montane forests. No records from forest plantations were found, however, noticeable presence of *H. erinaceus* in managed forests were recorded. Tree species composition in the latter category of forests largely corresponds to natural species distribution predicted for the region (Vladovič et al., 2014) but is under permanent influence of silvicultural interventions. We recorded two occurrences in biotopes other than forest – in steppe on black locust trunk (*Robinia pseudoacacia*) and in an urban area on ancient specimen of beech (*Fagus sylvatica*) in the warmest region of Slovakia. The black locust is an introduced species in Slovakia and was planted in the area, so the species is evidently able to colonize secondary woodlands in Slovakia.

Old-growth forests and their remnants (defined as min. 5 ha in area) cover 0.49% of the forest area in Slovakia (www.pralesy.sk/lokality/). It is clear that not all locations that are potentially suitable for *H. erinaceus* were surveyed, some old-growth forests have no mycological description at all. The lack of data is mainly related to the strict legal protection, restricting public access to wooded areas with the highest conservation value in Slovakia. There are four old-growth forests with dominance of oaks in Slovakia, which were surveyed for this study, but the majority of old-growth forests are dominated by beech – with minor contribution from other species. It is reasonable to expect that in future we will see more confirmed finds of *H. erinaceus* originating from both old-growth forests and other stands, giving us an opportunity to better describe and understand its ecology and value as an indicator species.

The species was found in similar numbers on living and dead trees (fallen logs) but less frequently on cut stumps, in a pattern similar to that observed in the Czech Republic (Holec and Beran, 2006). In the UK the fungus is typically found fruiting high up on wounds, or broken branch stubs of living trunks, but finds on fractured or fallen large diameter (>10 cm) pieces of wood have also been reported (Boddy et al., 2011). Although basidiomata are frequently found on living trees, a more detailed survey indicates that they tend to appear within deceased parts of living trees. The same was also observed by Boddy et al. (2011) as basidiomata on living trees occur predominantly in knotholes, fissures or wounds, often on old or senescing trees. This may suggest that *H. erinaceus* acts as a necrotrophic parasite (Fraiture and Otto, 2015) but perhaps more likely is that it rots dead central tissues, and wounds etc. provide an exit route for fruiting. Based on our observations, the species is predominantly found in the following two types of habitat. Firstly, sun-exposed veteran trees with wounds, especially on ridges and crests, with wounds caused by frost, lightning or branch drops. Secondly, on medium sized stems (from 30 to 50 cm in diameter) lying in wet microhabitats in more closed conditions in old-growth forests. Occasionally, basidiomata on solitary trees in very dry conditions were observed on trunks with no visible wounds.

In Europe, the primary natural habitat of this species can be best described as temperate lowland forests. According to available data, no collection in Slovakia was recorded in floodplain lowland forests. Interestingly, there is no record of *H. erinaceus* (Sikora and Neubauer, 2015) from one of the best known lowland forest in Europe – Białowieża Forest. The reasons for this absence could be the cool continental macroclimate prevalent in the region and the marked dominance of *Quercus robur* amongst the oaks in the

Download English Version:

<https://daneshyari.com/en/article/5517632>

Download Persian Version:

<https://daneshyari.com/article/5517632>

[Daneshyari.com](https://daneshyari.com)